REMARKS/ARGUMENT

Claims 1-32 are pending in the present application. Claims 1-15 and 22-32 are withdrawn from consideration. Claims 16-21 are rejected. No new matter is added.

CLAIM REJECTIONS - 35 U.S.C. §103

Claims 16-21 are rejected under 35 U.S.C. §103(a) as being unpatentable over the combination of Chui et al. (U.S. Patent No. 5,604,824), Kolarov et al. (U.S. Patent No. 6,144,773) and Said et al. (An Image Multi Resolution Representation for Lossless and Lossy Compression). In particular, the Office Action states that the combination of Chui et al., Kolarov et al. and Said et al. disclose an image compression system with a compressor for providing a compressed image based on an integer wavelet transform involving a lifting scheme or a correction method, in which the wavelet coefficients have a finite number of bits that are no greater in number than the highest count for the number of bits for any of the pixels of the image. The rejection is respectfully traversed.

With regard to the present invention, it is first noted that the main feature of the present invention is that wavelet coefficients can be derived from an image with pixels represented by a number of bits with each of the pixels typically being represented by the same number of bits. The wavelet coefficients that are derived from the image composed of pixel elements are themselves represented by a number of bits that are no more in number than the number of bits used to represent each of the pixels. This central feature of the present invention permits fast and compact transformation from pixel representation to wavelet coefficients, and is undisclosed in any of the cited prior art references. In independent claims 16, 20 and 21, Applicants have specifically recited that each wavelet coefficient has "a finite number of bits that are no greater in number than the highest count for the number of bits for any of the pixels of the image." Accordingly, Applicants would like to specifically focus the examination of the present invention on this particular feature, and call to the Examiner's attention the fact that this feature is undisclosed in any of the cited prior art references.

In the Office Action, the Examiner states that, while not shown by Chui et al., Kolarov et al. disclose "wavelet transform having a same finite number of bits that are no greater than the highest count for the number of bits for any of the pixels of the image." The Examiner cites

Figures 3a and 4a – 4c, as well as the description by Kolarov et al. at col. 19, line 19 – col. 20, line 13. In reaching this conclusion, the Examiner states only that the feature recited in the claims is provided by Kolarov et al., and relies on particular portions of that disclosure for support.

A review of Figure 3a and Figures 4a – 4c of the disclosure by Kolarov et al. reveals that the compression operations and procedures discussed are conducted on wavelet coefficients, rather than on pixels or other image representations. That is, the algorithm disclosed by Kolarov et al., especially in Figures 4a – 4c, focuses on operations performed ***after*** wavelet coefficients have already been obtained. Kolarov et al. reveal nothing with respect to obtaining the wavelet coefficients other than conventional techniques. Instead, Kolarov et al. explain how to reorganize and process wavelet coefficients that are obtained as a result of conventional wavelet transforms. It is the wavelet coefficients themselves that are processed in the zero-tree coding modification presented by Kolarov et al. as the central part of their invention, which provides a technique for ordering significant bits (represented by S(N)) to obtain the maximum amount of detail for a transferred representation in the shortest amount of time. This operation has nothing whatsoever to do with the generation of the wavelet coefficients themselves. Kolarov et al. only explain that for each bit plane that is output, significance bits are determined that correspond to wavelet coefficients according to the G-tree hierarchy disclosed by Kolarov et al. In short, Kolarov et al. never in fairness discuss a relationship between the number of bits in representing a pixel and the number of bits in a wavelet coefficient derived from the image representation. At most, Kolarov et al. give an example of how to generate significance bits to optimize transfer of information representing a function defined upon a selected geometric manifold. No relationship between the number of bits representing a pixel and the number of bits in a wavelet coefficient is even mentioned, let alone discussed in any meaningful way.

Indeed, the Office Action refers to the disclosure by Said – Pearlman that is incorporated by reference into the disclosure by Kolarov et al., which also reveals the information discussed in the disclosure by Kolarov et al. at col. 19, line 19 – col. 20, line 13, as cited in the Office Action. A copy of the reference by Said – Pearlman is enclosed for the Examiner's reference. In particular, Kolarov et al. reference Algorithm II of Said – Pearlman as being analogous to the algorithm disclosed in Figures 4a – 4c (col. 19, lines 25-32 and lines 55-64). Even a cursory examination of the reference by Said – Pearlman discloses that it is the conventionally obtained

wavelet coefficients that are manipulated to transfer the maximum amount of information, i.e., the bits of significance, in the shortest amount of time. See section VI of Said – Pearlman, beginning on page 8. It is apparent that the disclosure by Kolarov et al. draws almost exclusively on the reference by Said – Pearlman to obtain an algorithm for generating significance bits as applied to a new type of data representation for a function on a manifold. Again, neither Kolarov et al. nor the reference by Said – Pearlman disclose a wavelet transformation wherein each of the wavelet coefficients have a finite number of bits that are no greater in number than the highest count for the number of bits for any of the pixels of the image.

Applicants therefore note that, although the Office Action makes conclusory statements about the disclosure by Kolarov et al., the reference does not actually support such conclusions. In effect, the Examiner has not provided appropriate evidence of obviousness as required to establish a *prima facie* case of obviousness. With regard to rejections under 35 U.S.C. §103, "***the Examiner must provide evidence*** which as a whole shows that the legal determination sought to be proved (i.e., the reference teachings establish a *prima facie* case of obviousness) is more probable than not (emphasis added)." In the instance at hand, the Examiner has stated only that:

> [i]t would have been obvious to one having ordinary skill in the art at the time the invention was made to transform with resulting coefficients having a number of bits that are no grater in number than the highest count for the number of bits for any of the pixels in the image

which is merely the legal determination sought to be proved. Because the Examiner has not met the burden of providing evidence that the legal determination of *prima facie* obviousness is more probable than not, Applicants respectfully submit that the rejection of claims 16, 20 and 21 is overcome. That is, neither Chui et al., Kolarov et al. nor Said et al. show or suggest all of the recited claim limitations either alone or in combination. MPEP §4103.03. Claims 17-19 depend upon claim 16 and include all of its limitations in addition to further limitations recited in each dependent claim.

In view of the above discussion, Applicants respectfully submit that claims 16 –21 are patentable over the cited prior art references, either alone or in combination, and respectfully

request that the rejection of claims 16 –21 under 35 U.S.C. §103(a) be reconsidered and withdrawn. As an aid to understanding the nature of the key features of the present invention, Applicants further attach herewith a discussion by the first named inventor of the present invention, Dr. Hongyang Chao, for review by the Examiner. Applicants submit that none of the cited prior art references disclose or even suggest the novel approach by the inventors to reduce the representation size of the wavelet coefficients in accordance with the size of the pixel elements of the represented image. Accordingly, Applicants respectfully believe that a *prima facie* case of obviousness cannot be established as against the present invention recited in claims 16 – 21 in view of the disclosures of the cited prior art references.

CONCLUSION

Applicants respectfully believe that the foregoing is a complete and accurate response to all issues raised in the most recent Office Action. In view of the above discussion, Applicants respectfully submit that the present application is now in condition for allowance, and earnestly solicit notice to that effect.

If it is believed that an interview would contribute to allowance of the claims, the Examiner is requested to contact the undersigned counsel at the number provided below.

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as First Class Mail in an envelope addressed to: Asst. Commissioner for Patents, Washington, D.C. 20231, on September 30, 2002:

Brendan J. Kennedy

Name of applicant, assignee or Registered Representative

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Signature

September 30, 2002

Date of Signature

Respectfully submitted,

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